

22735

Ser. No.
10/876, 463

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
12 July 2001 (12.07.2001)

PCT

(10) International Publication Number
WO 01/50065 A1(51) International Patent Classification⁷: F24C 3/02, 3/08,
15/10, 15/12, F23D 14/46

(74) Agents: CALHOUN, Douglas, C. et al.; A. J. Park, Intellectual Property Lawyers and Patent Attorneys, Huddart Parker Building, 1 Post Office Square, Wellington (NZ).

(21) International Application Number: PCT/NZ00/00263

(22) International Filing Date:
22 December 2000 (22.12.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
502170 6 January 2000 (06.01.2000) NZ

(71) Applicant (for all designated States except US): FISHER & PAYKEL LIMITED [NZ/NZ]; 78 Springs Road, East Tamaki, Auckland (NZ).

(72) Inventor; and

(75) Inventor/Applicant (for US only): BROWN, Simon, Denzil [NZ/NZ]; 11 Hereford Street, Roslyn, Dunedin (NZ).

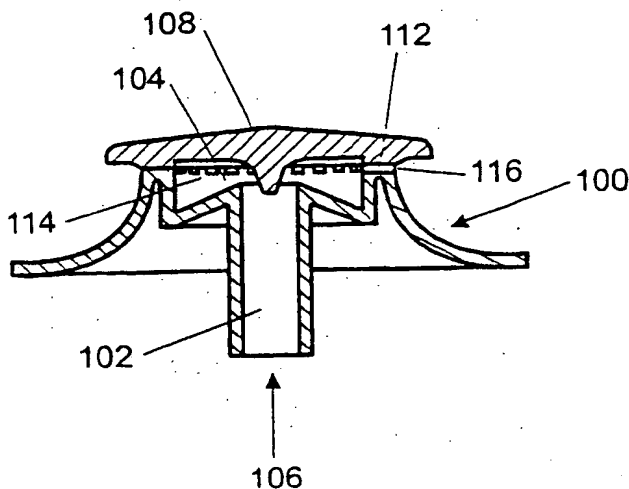
(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: GAS HEATING APPLIANCE



(57) Abstract: The present invention relates to a gas burner particularly suited for gas heating appliances for cooking food. In particular the present invention comprises a generally circular moulded body (100) including gases inlet (106) and an internal cavity (114). The internal cavity (114) is covered by a substantially transparent glass cap (108), which also bounds on the gas outlets (116). In this fashion, due to the transparency of the glass cap (108) at low flame improve controllability and safety are achieved by visual feedback of the flame size.

WO 01/50065 A1

GAS HEATING APPLIANCE

TECHNICAL FIELD

This invention relates to a substantially transparent cap for a heating appliance particularly though not solely for use as a gas burner cooktop.

BACKGROUND ART

There are a number of methods known in the art for providing heating in a cook top. One of the preferred methods is using a gas burner due to the ability to deliver high levels of heating when required and also relatively fine levels of control. It is typical of such gas burners that the finest levels of control will be desired at the low end of the output range.

Various methods have been postulated in order to implement fine control in the lower output range. For example, US 5,009,393 discloses a gas turn down valve with a relatively gradual control characteristic which provides a greater level of control especially at lower outputs compared to traditional gas valves. In a further improvement described in Korean Patent 9,208,198 an electromechanical actuator is used to rotate the gas valve in order to achieve fine levels of control across the entire range of output.

However, while these prior art systems do provide improved control, it would be desirable to have a simple system which by way of visual feedback allowed fine control at low levels of burner output.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a gas burner which goes someway to achieving the above mentioned desiderata or which will at least give the public a useful choice.

Accordingly in a first aspect the present invention consists in gas burner comprising:

- a body portion including a gas inlet and an open inner cavity in fluid communication with said gas inlet,

- a substantially transparent cover means adapted to engage or attach to said body portion and thereby substantially cover said inner cavity and,

- a plurality of gas outlets substantially adjacent the boundary formed between said

cover means and said body portion and in fluid communication with said inner cavity.

To those skilled in the art to which the invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the scope of the invention as defined in the appended claims. The disclosures and the descriptions herein are purely illustrative and are not intended to be in any sense limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

One preferred form of the present invention will now be described with reference to the accompanying drawings in which;

Figure 1 is a cut-away view of the gas burner according to the preferred embodiment of the present invention,

Figure 2 is a plan view of the body portion according to the preferred embodiment of the present invention,

Figure 3 is a perspective view of the substantially transparent glass burner cap according to the preferred embodiment of the present invention,

Figure 4 is a plan view of the gas burner at a low flame setting according to the preferred embodiment of the present invention,

Figure 5 is a plan view of the gas burner on a high flame setting according to the preferred embodiment of the present invention,

Figure 6 is a side view of the wok-style burner, and

Figure 7 is a plan view of the wok-style burner.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to Figure 1 and 2 a gas burner is shown according to the referred embodiment of the present invention. The gas burner is formed of a body portion 100 including a gas inlet 102 and an internal cavity 104 such that the gas flows from the gas supply 106 into the internal cavity 104. The top of the internal cavity 104 is closed off with a substantially transparent glass cap 108 which attaches overtop of and overhangs the body portion 100. The gas then flows from the internal cavity out through outlet channels 112 formed on the top face 114 of the body portion 100 to the outlet ports 116 where the gas is ignited and heats the cooking vessel (not shown).

Referring to Figure 3 we see the burner cap 108 in more detail. The cap 108 may optionally include a central cone 150 designed to fit down the internal cavity (104, Figure 1) of the body portion (100, Figure 1). On the underside is a flat annular face 152 designed to sit firmly upon the upper face (114, Figure 1) of the body portion. The cap 108 also includes an outer flange 156, which overhangs the body portion (100, Figure 1). The outer flange 156 is designed to diffuse the flames before they contact the heating vessel.

The glass cap itself is composed of a typical ceramic type glass. Such glass is designed with a significant resistance to thermal shock and high contact temperature, such as expected when exposed to a gas fuelled flame. A Borosilicate based glass would be particularly appropriate.

The present invention is shown in use in Figures 4 to 5. At low flame, seen in Figure 4 the actual flame 200 is only seen by virtue of the cap 202 being transparent. At high flame the flames 204 extent past the outer flange 206, and are evenly distributed around the circumference. By virtue of the flames being visible at low flame more accurate control and greater safety is possible over prior art burners.

A further improvement would be to mould designs or text onto the underside of the glass cap. This would allow the top face to be easily cleaned. The manufacturers name or other designs would then be visible from above.

It will be appreciated that by providing a low thermally conductive material such as the glass cap as opposed to the conventional cast iron, or highly thermally conductive caps, that the performance of the gas burner may improve. At low flame with a highly thermally conductive cap there is the potential for "quenching" or partial extinction of the flame. This results in partial combustion with the by-product of higher CO emissions. With the low thermal conductivity of the glass cap according to the present invention, the potential for "quenching" is much reduced. Therefore the burning is more controlled, more efficient and the CO emissions are potentially reduced, especially at low outputs.

Another advantage to the present invention relates to the fact that with glass or other transparent thermally retardant material as the burner cap, the need for a separate coating operation of the burner cap is eliminated. Traditionally with cast iron or cast aluminium burner caps, due to the fact that they are constantly in contact with combusting

illustrated in a configuration for a wok-style burner. In this case the main body 210 is substantially composed as described in the preceding embodiments, having outlets 212 on the outer periphery 214 of a raised portion 211 inset from the edge of the main body 210. However rather than having the inner cavity completely open, the main body includes a covered centre section 216 extending approximately $2/3$ the radius of the outer periphery 214 to form an inner periphery 218 to the raised portion. Included on the inner periphery are a further set of outlet ports 220 to provide flames towards the centre of the wok to provide more even heating and to ensure that the centre of the wok is sufficiently hot as is often desirable when cooking with a wok.

Also shown in Figures 6 and 7 is the trivet plate 222 which supports the wok (not shown) above the flames. The trivet 222 supports the wok about an annular path 224 which allow the wok (not shown) to be readily moved and removed, ensuring adequate flame contact to the underside of the wok and minimal flame contact on the trivet.

The substantially transparent glass cap 226 as described in the previous embodiments is in this case embodied in an annular ring with tapered portions (or rounded edges) at its inner 228 and outer 230 peripheries. Again the cap 226 is composed of a similar material and at low flame ensures full visibility of the flame. At high flame as shown in Figure 6, the flames can be seen both inwardly and outwardly of the raised portion 211. It will be readily apparent to one skilled in the art the advantages to the system described above and as defined in the appended claims.

CLAIMS

1. A gas burner comprising:
 - a body portion including a gas inlet and an open inner cavity in fluid communication with said gas inlet,
 - a substantially transparent cover means adapted to engage or attach to said body portion and thereby substantially cover said inner cavity and,
 - a plurality of gas outlets substantially adjacent the boundary formed between said cover means and said body portion and in fluid communication with said inner cavity.
2. A gas burner as claimed in claim 1 wherein said cover means is substantially composed of glass.
3. A gas burner as claimed in claim 1 wherein said cover means is composed of a glass mixture with substantial resistance to thermal shock.
4. A gas burner as claimed in claim 1 wherein said cover means is composed of glass ceramic.
5. A gas burner as claimed in claim 1 wherein said cover means is composed of a silica based glass mixture.
6. A gas burner as claimed in claim 1 wherein said cover means is composed of a borosilicate glass mixture.
7. A gas burner as claimed in any one of the preceeding claims wherein said plurality of gas outlets comprises a number of channels formed in what is in use the upper face of said body portion, said channels running from the inner cavity of said body portion to the outer circumference of said body portion.

8. A gas burner as claimed in any one of claims 1 to 6 wherein said plurality of gas outlets comprises a number of channels formed in what is in use the lower face of said cover means, said channels running from (when said cover means is in place atop said body portion) the inner cavity of said body portion to the outer circumference of said body portion.
9. A gas burner as claimed in any one of claims 1 to 6 wherein said plurality of gas outlets comprise a plurality of holes in said body portion, extending from said inner cavity to the exterior.
10. A gas burner as claimed in any one of the preceeding claims wherein said cover means includes lettering or designs moulded into or printed onto what is in use the underside of said cover means.
11. A gas burner as claimed in any one of the preceeding claims wherein said body portion includes a centre portion and said inner cavity comprising an annular cavity around said centre portion, said plurality of gas outlets comprising inner outlets facing inwardly substantially toward the centre of said burner and outer outlets facing substantially outwardly of said burner, and said cover means comprising a substantially transparent annular ring substantially covering said annular cavity.
12. A gas burner as claimed in any one of the preceeding claims wherein said cover means including a tapered portion on the outer circumference thereof.
13. A gas burner substantially as herein described with reference to and as illustrated by the accompanying figures.

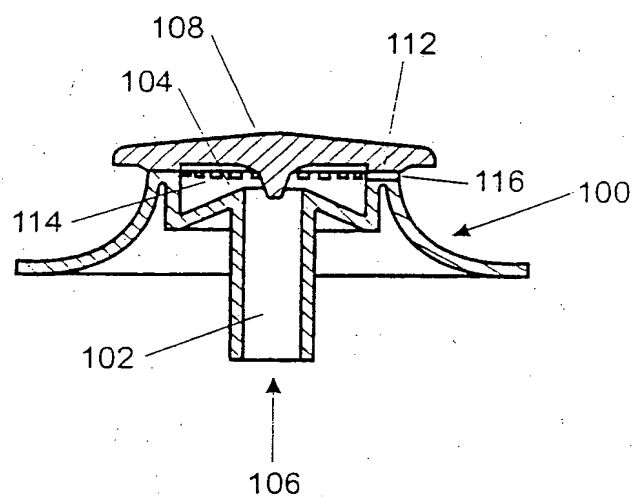


FIGURE 1

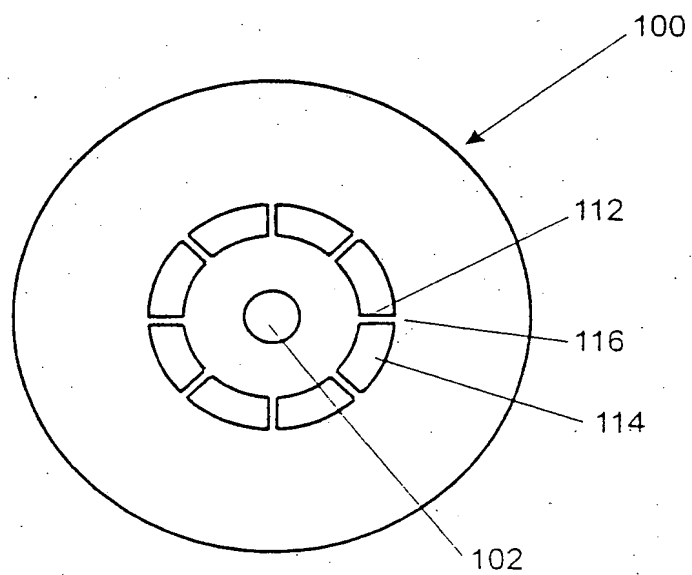
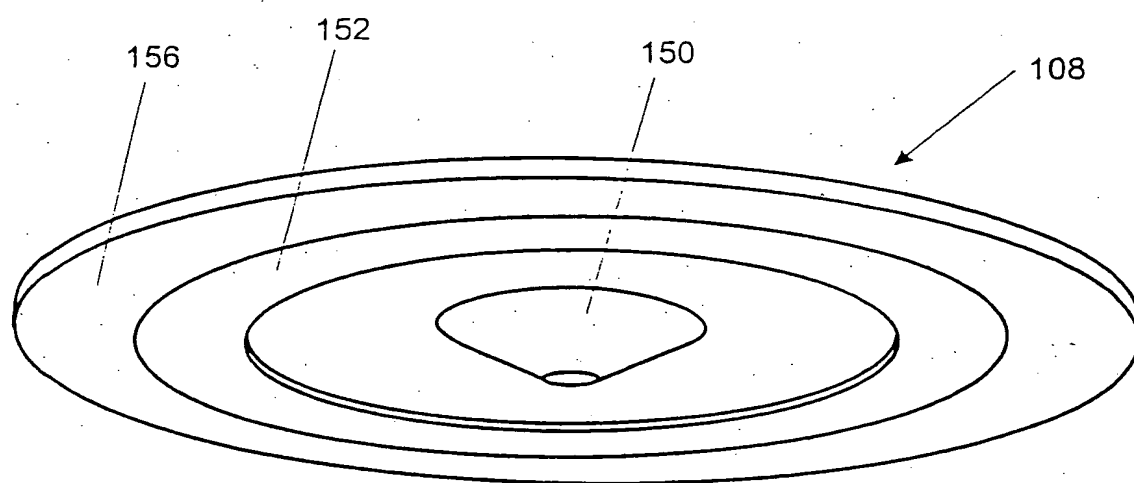


FIGURE 2

**FIGURE 3**

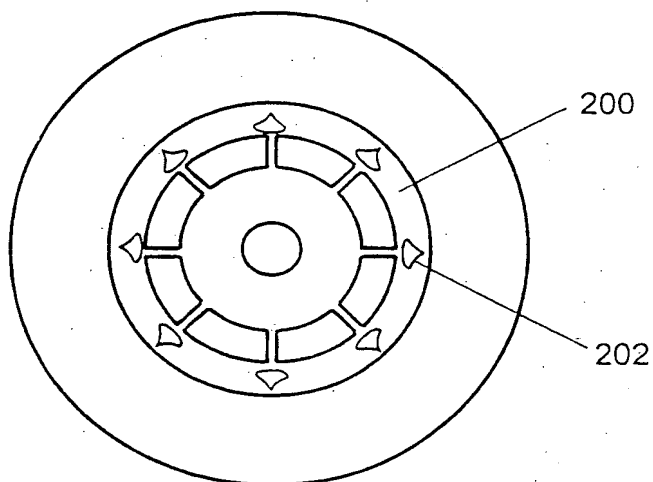


FIGURE 4

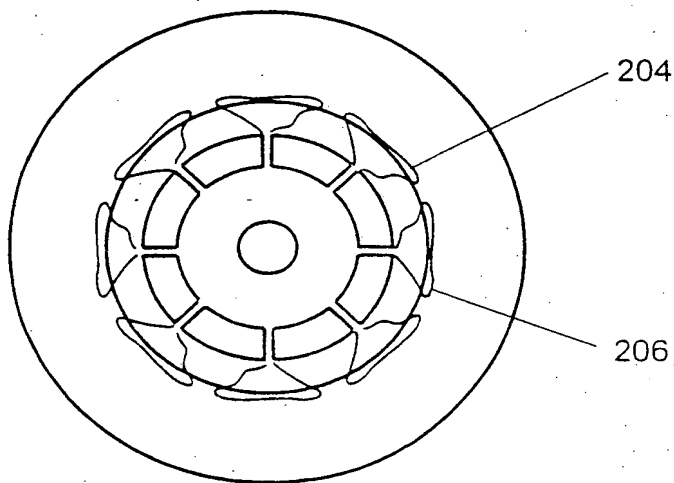


FIGURE 5

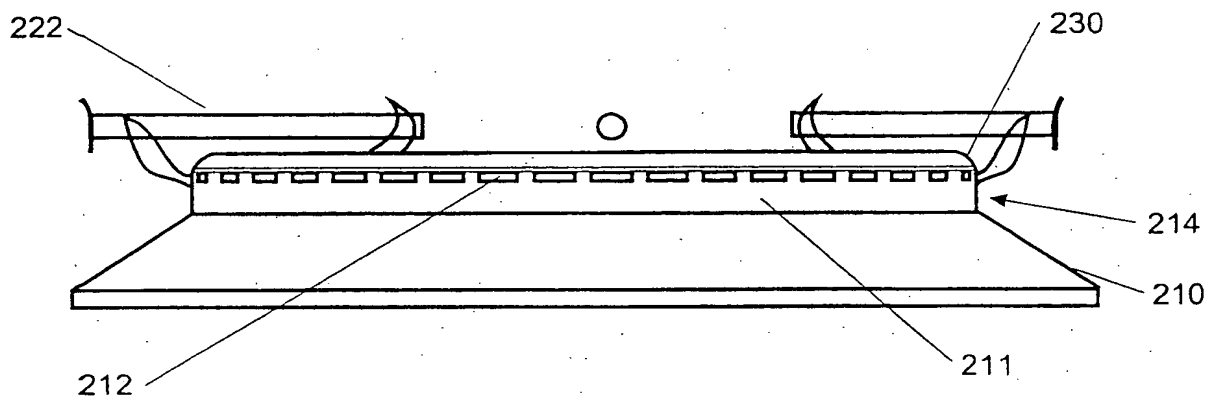


FIGURE 6

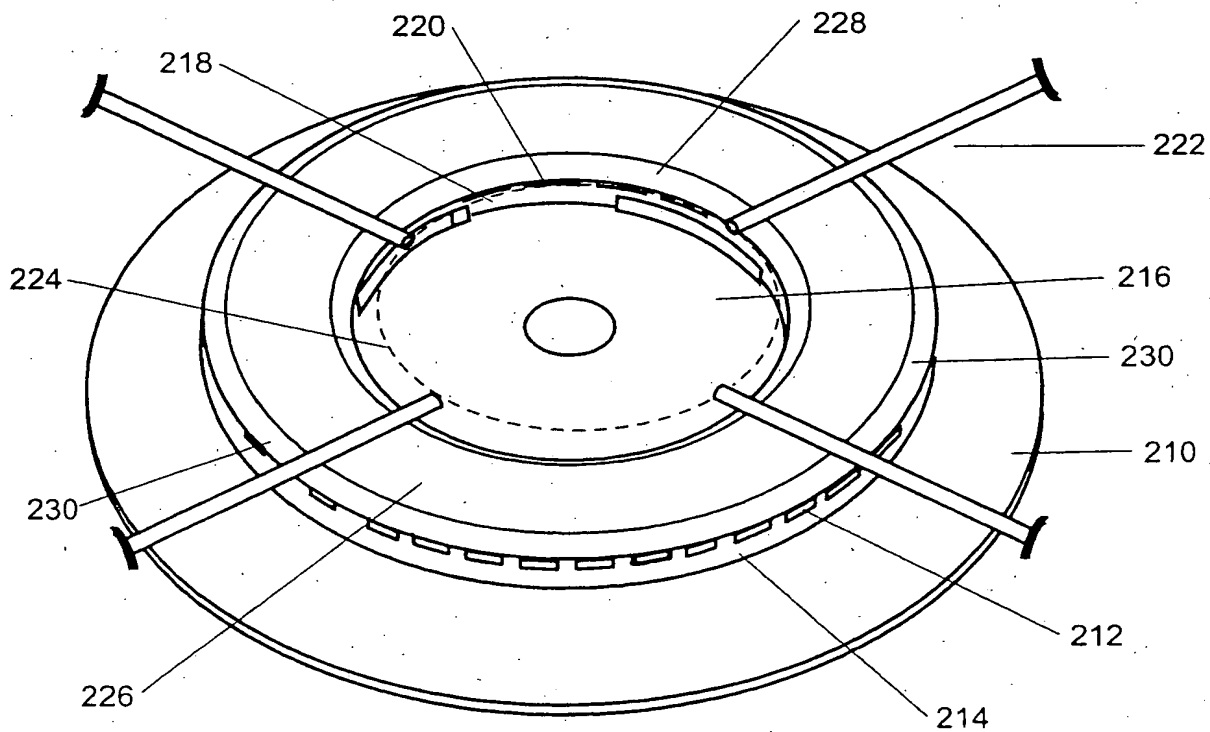


FIGURE 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 00/00263

A. CLASSIFICATION OF SUBJECT MATTER																						
Int Cl ⁷ : F24C 3/02, 3/08, 15/10, 15/12, F23D 14/46																						
According to International Patent Classification (IPC) or to both national classification and IPC																						
B. FIELDS SEARCHED																						
Minimum documentation searched (classification system followed by classification symbols) IPC F24C 3/IC, 15/00, 15/10, 15/12, F23D 14/IC.																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI and Japio with keywords : (Gas) (3D) (burner?, cooktop?, cooker?, stove?, range); transparent, clear, translucent, glass, translucent; cover, lid, top, cap.																						
C. DOCUMENTS CONSIDERED TO BE RELEVANT																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	US 5186158 A (FERLIN) 16 February 1993. Col. 2, lines 3-32, figs. 1, 4.	1-12																				
X	EP 0521833 A (SMEG S.P.A.) 7 January 1993. Claim 1, fig. 2:	1-12																				
X	DE 29805620 U (SCHOTT GLAS) 25 June 1998. Page 6, line 11 - page 7, line 4; figs.	1-12																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex																						
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A"</td> <td>Document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"A"	Document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family	"P"	document published prior to the international filing date but later than the priority date claimed		
"A"	Document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention																			
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																			
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																			
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family																			
"P"	document published prior to the international filing date but later than the priority date claimed																					
Date of the actual completion of the international search. 23 March 2001		Date of mailing of the international search report 30 MARCH 2001																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No.: (02) 6285 3929		Authorized officer M.E. DIXON Telephone No.: (02) 6283 2194																				

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 00/00263

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	AU 56029/96 A (AUSMARK INTERNATIONAL PTY. LTD) 9 January 1997	

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NZ 00/00263

Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 13
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Claim 13 relies on reference to the description and drawings (Rule 6.2 (a))
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/NZ 00/00263

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	51 86158.	NONE	
EP	0521833	NONE	
DE	29805620	NONE	
AU	56029/96	GB	2302940

END OF ANNEX

THIS PAGE BLANK (USPTO)